

CLAIMS

1. A process for the enzymatic synthesis of flavonoid esters and derivatives in which

5 a) a reaction medium containing an organic solvent, a glycosylated flavonoid or aglycon flavonoid, an acyl group donor and an enzymatic catalyst is prepared,

10 b) further quantities of flavonoid and/or acyl donor are optionally added during the reaction and

10 c) the esters thus obtained are purified by removing enzymatic particles and the solvent,

characterized in that the concentration of water and/or alcohol formed during the reaction is controlled so that it remains below 150 mM.

15 2. A process as claimed in claim 1, characterized in that the concentration of water and/or alcohol formed during the reaction is controlled so that it remains below 100 mM.

3. A process as claimed in claim 1, characterized in that the molar ratio of flavonoid to acyl donor in the reaction medium is adjusted so that is in

20 the range from 0.01 to 20.00 during the reaction.

4. A process as claimed in claim 1, characterized in that the molar ratio of flavonoid to acyl donor in the reaction medium is adjusted so that is in the range from 0.02 to 10.00 during the reaction.

5. A process as claimed in claim 1, in which further quantities of at

25 least one flavonoid in solid form or in the form of a liquid solution, solvent, enzymatic catalyst in soluble or immobilized form and acyl donor compound either as such or solubilized in the solvent are continuously or periodically added to the reaction medium.

6. A process as claimed in claim 1, in which at least one constituent of

30 the reaction medium is periodically or continuously removed and, after

fractionation, is returned to the reactor.

7. A process as claimed in claim 6, in which the entire reaction medium is periodically or continuously removed during the reaction and, after fractionation, one or more constituents of the medium removed are re-injected into the reactor.

8. A process as claimed in claim 1, in which, during the reaction, the temperature is adjusted to 20 to 100°C, the partial pressure over the reaction medium is adjusted to 10 mbar to 1,000 mbar and the reaction medium is stirred.

10 9. A process as claimed in claim 1, in which residual flavonoids or residual acyl donor are eliminated by extraction with organic solvents or supercritical fluids, by distillation, by crystallization, by adsorption or by precipitation.

15 10. A process as claimed in claim 1, in which the flavonoid esters produced are fractionated by precipitation or chromatographic separation.

11. A process as claimed in claim 1, in which the flavonoid is selected from the group consisting of chalcone, flavone, flavanol, flavanone, anthocyan, flavanol, coumarin, isoflavone and xanthone.

12. A process as claimed in claim 1, in which acyl donor compound is selected from the group consisting of a linear or branched, saturated, unsaturated or cyclic aliphatic acids containing up to 22 carbon atoms and optionally substituted by one or more substituents selected from the group consisting of hydroxyl, amino, mercapto, halogen and alkyl-S,S-alkyl, for example palmitic acid, 16-hydroxyhexadecanoic acid, 12-hydroxystearic acid, 11-mercaptopundecanoic acid, thiooctanoic acid or china acid, linear or branched, saturated or unsaturated aliphatic diacids containing up to 22 carbon atoms, for example hexadecane diacid or azelaic acid, an arylaliphatic acid and a dimeric acid derived therefrom, a cinnamic acid optionally substituted by one or more substituents selected from the group consisting of hydroxyl, nitro, alkyl, alkoxy and halogen atoms, for example

coffeic acid (3,4-dihydroxycinnamic acid), ferulic acid (4-hydroxy-3-methoxycinnamic acid) or coumaric acid (4-hydroxycinnamic acid), a benzoic acid optionally substituted by one or more substituents selected from the group consisting of hydroxyl, nitro, alkyl, alkoxy and halogen atoms, for example gallic acid (3,4,5-trihydroxybenzoic acid), vanillic acid (4-hydroxy-3-methoxybenzoic acid) or protocatechu acid (3,4-dihydroxybenzoic acid) or the methyl, ethyl, propyl or butyl esters of these compounds.

13. A process as claimed in claim 1, in which the organic solvent is selected from the group consisting of propan-2-ol, butan-2-ol, isobutanol, acetone, propanone, butanone, pentan-2-one, ethane-1,2-diol, butane-2,3-diol, dioxan, acetonitrile, 2-methylbutan-2-ol, tert.butanol, 2-methylpropanol and 4-hydroxy-2-methylpentanone, aliphatic hydrocarbons, such as heptane and hexane, and mixtures of at least two of these components.

14. A process as claimed in claim 1, in which the organic solvent is the acyl donor.

15. A process as claimed in claim 1, in which the enzymatic catalyst comprises a protease and/or lipase.

16. A process as claimed in claim 15, characterized in that the protease and/or lipase is/are immobilized on a carrier.

17. A process as claimed in claim 1, in which the water and/or the alcohol is/are removed from the medium in the gas or liquid phase by molecular sieves.

18. A process as claimed in claim 1, in which the water and/or the alcohol is/are removed from the medium in the gas or liquid phase by pervaporation.